Electromagnetic Theory II: Homework 23

Due: 14 May 2021

1 Tilted capacitor

A capacitor consists of two parallel plates at rest relative to each other. In the rest frame of the plates they are tilted at a 45° angle to the x axis (the normal to the plates is along $(-\hat{\mathbf{y}}+\hat{\mathbf{z}})/\sqrt{2}$). In their rest frame, the charge density on one plate is $+\sigma$ and on the other, $-\sigma$.

a) Assuming that the plates are infinite in extent, determine the electric and magnetic fields produced in their rest frame.

b) Determine the electric and magnetic fields as viewed from a frame that travels with velocity $\mathbf{v} = v\hat{\mathbf{x}}$ with respect to the rest frame of the plates.

2 Griffiths, *Introduction to Electrodynamics, 4ed*, 12.44, page 561.